Solution. First fixing $x \in \mathbb{R}^3$, we find the range of values of t for which the sphere with center x, radius t intersects the annulus $A(r_0, r_1)$. Drawing a diagram, we find three cases, depending on $r = |x|$:

(i) $r > r_1$. Then $r - r_1 < t < r + r_1$;
(ii) $r_0 < r < r_1$. Then $0 < t < r + r_1$;
(iii) $0 \leq r < r_0$. Then $r_0 - r < t < r + r_1$.

Now draw a spacetime diagram (in the (r, t) first quadrant) with this information, and read it for $t = \mathit{const}$ slices to find $K(t)$. The answer again falls into three cases:

(a) $t < r_0$. Then $K(t)$ is the annulus $A(r_0 - t, r_1 + t)$;
(b) $r_0 < t < r_1$. Then $K(t)$ is the ball $B(r_1 + t)$ (centered at the origin);
(c) $t > r_1$. Then $K(t)$ is again an annulus: $A(t - r_1, t + r_1)$.

Question: How would this change for the wave equation in $\mathbb{R}^2$?